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Ratios Available for Financial Analysis, by J. Chester Crandell..... 1349

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EDITORIAL DEPARTMENT NOTE

Accountants have been told frequently that they give too much attention to the collection and classification of accounting data and too little attention to its analysis, presentation and use. The increased size of the economic unit and its increased complexity have made necessary a greatly improved technique for the collection, analysis, classification and accumulation of accounting data. They have also rendered more difficult the interpretation of the data collected. Various techniques have been developed to aid the accountant, banker and business executive in their interpretation of accounting figures, not the least important of which is the ratio method of analysis. Ratios express relationship; changes in ratios indicate important trends. Often these relationships and trends cannot be detected by a study of dollar figures; in other cases, their significance can only be detected when stated in ratio form.

In this issue of the Bulletin we are presenting an article of special interest on the subject of ratio analysis. The material is presented in a form to make it most usable. Each ratio is discussed on a separate page with comparative statements (Exhibits A and B), at the end of the article, giving the figures upon which the calculations are based. Only the more significant ratios are presented, and in each case the use of the ratio, the interpretation of changes and, in most cases, the names of supplementary ratios are included.

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AUGUST 1, 1936

RATIOS AVAILABLE FOR FINANCIAL ANALYSIS

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THE fact that dollar figures by themselves are often misleading has led in recent years to the development of analytical procedure designed to produce reliable data concerning earning power and financial condition.

In the largest sense this analytical procedure aims to cast light on two sets of relationships: first, the relationship of each part of the financial statement to the whole; and second, the relationship between important parts.

Relation of Each Part to the Whole

The relationship of each part to the whole can readily be developed on the so-called percentage type of statement.

In the case of the percentage balance sheet, which is illustrated by the total columns at the right of Exhibit A at the end of this article the total of either side of the statement is considered to be 100% and each item on that side of the balance sheet is divided by the total.

In some cases, where it is desired to develop the relationship of each part to the whole after the exclusion of intangible assets such as goodwill, trademarks, etc., such intangibles are eliminated from the asset side of the balance sheet, and their book value is deducted from net worth, so that percentages can be developed as indicated in the Tangible columns at the right of Exhibit A.

In the case of the percentage profit and loss statement, which is illustrated by the % of Sales columns on Exhibit B, the items in general are expressed upon the basis of *net* sales (although gross sales, returns, allowances, and discounts are expressed upon the basis of gross sales).

The percentage form of statement is useful not only in showing the trend of a single company over a period of years, but also under the name of a common-size statement in measuring one company against another, or against a common-size statement developed for a group or an entire industry

Relations between Important Parts

Percentage statements point out the relationship of each part to the whole, but they do not indicate the relationships between im-

portant parts of the statements. This can only be accomplished by the use of ratios between the parts that have a particular bearing upon certain phases of condition or trend.

Ratios as presented in various publications and as used by credit analysts are many in number.* Moreover, they have been classified in various ways, sometimes from the point of view of their static or dynamic meaning, sometimes from the point of view of the analytical factor upon which they cast light, and sometimes from the point of view of the elements of the ratios.

For the purpose of this summary of the ratios available for financial analysis, it has been deemed best to select only the more significant ones, and in most cases to classify these upon the basis of the first element in the ratio, or the numerator of the ratio when expressed as a fraction.

Definition of Terms

Before presenting a list of what are deemed the more significant ratios in use today, it seems desirable, for the sake of clarification and standardization, to insert the following definitions to show the meaning of various terms used in subsequent ratios:

Current Assets—Total of all assets expected to be realized within one year from balance sheet date.

Current Liabilities—Total of all liabilities and accruals due within one year from balance sheet date, including current payments on long-term indebtedness.

Working Capital—Difference between the current assets and the current liabilities.

Operating Assets—Total of all assets except those not used in operations (for example, unused plant assets and assets which yield a separate return, such as securities).

Fixed Assets—Land and depreciated values of plant and equipment; non-marketable securities, or securities of necessity held permanently; and intangible assets such as deferred

* Credit is hereby given for basic material largely drawn from publications of the Robert Morris Associates and Dun & Bradstreet, and from the books "Ratio Analysis of Financial Statements" by Alexander Wall and R. W. Duning, and "Financial and Operating Ratios in Management" by James H. Bliss.

charges, goodwill, etc. The last group, however, is omitted when ratios are developed on a tangible asset basis.

Plant Assets—Total of all book values of land, buildings, machinery, equipment, leasehold improvements and other plant property, less reserves for depreciation.

Funded Debt—Mortgages, bonds, and notes maturing one year or more from the balance sheet date.

Net Profit—Profit after necessary valuation, expense and tax reserves, but before dividends or withdrawals of capital.

Tangible Net Worth—Excess of assets over liabilities, less any intangible items such as deferred bond discount, goodwill, etc.

Collection Period—Number of days that the total of trade accounts and notes receivable (including assigned accounts and discounted notes) represents in terms of average daily net charge sales (the annual net charge sales divided by the standard figure of 365).

Significant Ratios Available

The more significant ratios used for financial analysis today are as follows:

Current and Inventory Ratios

C 1	Current Assets	to	Current Liabilities
C 2	Trade Receivables	to	Inventory
C 3	Net Sales	to	Inventory
C 4	Net Charge Sales	to	Trade Receivables

Sales Ratios

S 1	Net Sales	to	Operating Assets
S 2	Net Sales	to	Operating Plant Assets
S 3	Net Sales	to	Working Capital
S 4	Net Sales	to	Net Worth

Profit Ratios

P 1	Operating Profit	to	Net Sales
P 2	Operating Profit	to	Operating Assets
P 3	Operating Profit	to	Operating PlantAssets
P 4	Net Profit	to	Net Sales

P 5	Net Profit	to	Net Worth
P 6	Net Profit	to	Common Stockholders Equity
P 7	Net Profit Left in Business	to	Net Profit

Net Worth and Debt Ratios

N 1	Net Worth	to	Liabilities
N 2	Net Worth	to	Fixed Assets
N 3	Plant Assets	to	Funded Debt
N 4	Borrowed Money	to	Cost of Borrowed Money
N 5	Total Assets	to	Theoretical Cost of Borrowed and Owned Capital

Expression of Ratios

In preparing the detailed presentation of each of these ratios, as shown on subsequent pages, the following points of procedure have been observed:

In speaking of any ratio, such as Current Assets to Current Liabilities, the word "to" always indicates the second quantity of the ratio, or the denominator of the fraction.

Each ratio, insofar as feasible, has been arranged so that an increase in the numerical answer indicates an improvement in financial position or operating trend.

Similar or closely allied ratios may often be developed, and this has been illustrated by supplementary lists to indicate the wide possibilities that lie in ratio analysis.

Ratios are often stated in different ways. For example, the Current Assets to Current Liabilities ratio may be found written as:

2 to 1;

2 (with the second part of the ratio understood);

$2 of current assets per $1 of current liabilities; or

200%

Since the percentage basis is the simplest way of expressing a ratio in one term, this method is used in subsequent calculations, except in the case of turnover ratios, which are expressed as number of "times" the turnover occurs.

The illustrative calculation of each ratio is based on data taken from Exhibits A and B, at the end of this article as indicated by the exhibit and item number references.

C 1 Current Assets to Current Liabilities

$$\frac{\text{Current Assets at a given date}}{\text{Current Liabilities at same date}}$$

This measures

Margin of safety available to unsecured creditors and secured creditors to whom current payments are due.

Increase in ratio indicates

Greater proportional margin of assets available to pay current indebtedness upon demand or upon the due dates.

What is a reasonable ratio depends to some extent upon the line of business. The popular 200% or 2:1 minimum ratio is a false security in some lines of business, whereas a less ratio may be satisfactory for other lines (e.g. quick turnovers).

1935	1934
A 6	B 6
A 17	B 17
701%	1270%

Supplementary Ratios

This ratio is not sufficient as a sole measure of margin of safety, as an increase may be due to a change in both current assets and current liabilities without a change in net working capital. To improve a ratio of *more than 100%*, a company has merely to pay off a portion of the current liabilities. Hence it may be necessary to consider the relative liquidity of assets and liabilities within the current group, and the working capital status, through such ratios as:

Cash and Trade Receivables	to	*Current Liabilities*
Inventory	to	*Current Liabilities*
Raw Material and Finished Goods	to	*Goods in Process*
Working Capital	to	*Inventory*
Working Capital	to	*Total Assets*

C 2 Trade Receivables to Inventory

Current Trade Accounts and Notes Receivable at a given date

Inventory as at same date

This measures

(1) The conversion of inventory items into receivables and it may be a primary factor in the increase in the ratio of current assets to current liabilities, for the conversion adds the equivalent of the profit on the sale to the asset side without a corresponding addition to the liability side.

(2) The reaction of the management to the phases of the business cycle when increased inventories or reduced inventories are desirable.

Any change in this ratio must be carefully investigated, for aside from the above major points either an increase or a decrease may indicate an improvement. For example, with other conditions constant—

The ratio would be increased by

(a) More effective sales efforts
(b) Advance sales on long credit to stabilize production
(c) Forcing sales
(d) Slowing down production } just before inventory
(e) Better planning (reduces raw material and work-in-process)
(f) Standardization (reduces finished goods and parts stock)

The ratio would be decreased by

(g) More effective collection efforts
(h) Manufacturing for stock during dull periods
(i) Larger purchases, anticipating rising prices

1935	1934
A 3	B 3
A 5	B 5
75.53%	83.92%

C 3 Net Sales to Inventory

$$\frac{\text{Net Sales during a given period}}{\text{Average Monthly Inventory during same period}}$$

This measures

Merchandising rapidity in the absence of extraordinary changes in selling price. This ratio does not represent the *actual physical turnover,* which would be determined by using as the numerator the cost of goods sold (or the net sales reduced by an estimated percentage of gross profit), and then dividing by the inventory at cost, this method being preferable wherever continuously available. As the result of the difficulty of obtaining the necessary cost of sales information, credit men have developed the practice of utilizing the ratio of sales (including profit) to inventory (at cost), not as an indication of exact turnover but as a usable measure of merchandising effectiveness from year to year.

Increase in ratio indicates

Greater merchandising rapidity and greater probability of salability and liquidity.

This is an advantage (disregarding the speculative aspect of holding goods for higher sales value later) as it tends to minimize:

Surplus stocks
Obsolete stocks (but it is not safe to rely on the ratio to disclose such stocks)
Carrying charges
Current liabilities
Loss on price decline

Current and Inventory C 3 (*Continued*)

	1935	1934
Merchandising Rapidity:	A 33	B 33
	$\frac{B\,5 + A\,5}{2}$	$\frac{C\,5 + B\,5}{2}$
	7.21 times	3.65 times

	1935	1934
True Inventory Turnover:	A 34	B 34
	$\frac{B\,5 + A\,5}{2}$	$\frac{C\,5 + B\,5}{2}$
	5.001 times	2.873 times

Supplementary Ratios

Raw Materials Used	to	*Raw Material Inventory*
Goods Finished	to	*Goods in Process Inventory*
Cost of Goods Sold	to	*Finished Goods Inventory*
Supplies Used	to	*Supplies Inventory*

C 4 Net Charge Sales to Trade Receivables

Net Charge Sales during a given period

Trade Accounts and Notes Receivable less Reserves Outstanding at end of period

This measures

Effectiveness of collection methods, although it cannot be relied upon to disclose existence of doubtful accounts.

Increase in ratio indicates

Better collection of charge accounts.

This is an advantage, as it tends to minimize:

Carrying charges
Collection expenses
Loss from bad debts

An unusually high ratio, however, may mean the hypothecation or sale of receivables.

1935	1934
A 33 — Cash Sales ($10,000)	B 33 — Cash Sales ($5,000)
A 3	B 3
9.346 times	4.551 times

Supplementary Ratio

A supplementary way of judging the effectiveness of collection methods is the "collection period method," to determine the number of days of average business tied up in trade receivables.

Trade Accounts and Notes Receivable

Net Charge Sales ÷ 365 (days)

1935	1934
A 3	B 3
A 33 — Cash Sales ($10,000)	B 33 — Cash Sales ($5,000)
365	365
39.1 days	80.2 days

S 1 Net Sales to Operating Assets

Net Sales during a given period

Total Assets at beginning of year

Minus Non-operating assets at beginning of year

Plus (a) Owned or borrowed capital contributed during year for operating assets, and (b) non-operating assets realized and put into operating assets—both averaged from date they could be expected to produce.

Minus (a) Withdrawal of owned or borrowed capital from operating assets (b) operating assets invested in non-operating assets, and (c) dividends paid from operating assets in excess of current earnings—all three averaged from withdrawal date.

This measures

Sales productivity of the dollars invested in operating assets.

Increase in ratio indicates

Greater turnover on assets employed in operations.

Improvement may be accomplished by .

Any action which will result in increase of any other turnover ratios except in some cases, S 4, Net Sales to Net Worth.

1935

$$\frac{\text{A } 33}{\text{B } 11 - \text{B } 2 - \text{B } 7 + \frac{\text{B } 7 - \text{A } 7}{2} - \frac{3\,(\text{B } 19)}{4} - \frac{\text{A } 2 - \text{B } 2}{2}}$$

1.311 times

Sales S 1 (*Continued*)

$$\frac{1934}{\dfrac{B\ 33}{C\ 11 - C\ 2 - C\ 7 - \dfrac{B\ 2 - C\ 2}{2}}}$$

.565 times

Related and interdependent ratios are P 1, Operating Profit to Net Sales, and P 2, Operating Profit to Operating Assets. Operating profit per dollar of net sales, times the turnover of operating assets, produces the operating profit per dollar of operating assets thus

$$\frac{P\ 1}{\dfrac{\text{Operating Profit}}{\text{Net Sales}}} \times \frac{S\ 1}{\dfrac{\text{Net Sales}}{\text{Operating Assets}}} = \frac{P\ 2}{\dfrac{\text{Operating Profit}}{\text{Operating Assets}}}$$

Supplementary Ratio

Net Sales to *Tangible Operating Assets*

This ratio excludes from the denominator goodwill and other intangibles.

S 2 Net Sales to Operating Plant Assets

Net Sales during a given period (or Number of Units Sold to disregard price fluctuations)

Total Operating Plant Assets less depreciation reserves at beginning of year

Plus Additions to Operating Plant Assets during year, averaged from date they could be expected to produce

Minus Operating Plant Assets sold or scrapped during year, averaged from date they ceased to be used

This measures

Sales productivity of the dollars invested in operating plant assets.

Increase in ratio indicates

Greater turnover on operating plant assets.

Improvement may be accomplished by

Increasing sales, or
Maintaining same sales with smaller investment in plant assets.

	1935	1934
	A 33	B 33
	$\frac{\text{B 8} + \$89{,}664 - \$20{,}000}{2}$	$\frac{\text{C 8} + \$17{,}544 - \$15{,}000}{2}$
	2.666 times	1.317 times
Tons Sold per Dollar of Operating Plant	.0139	.0067

Supplementary Ratios

Net Sales to *Total Plant Assets*
The denominator includes all plant assets, whether or not used in operations.

Net Sales to *Operating Fixed Assets*

The denominator includes all fixed assets except unused plant assets and non-marketable securities.

Net Sales to *Tangible Operating Fixed Assets*

The denominator excludes goodwill and other intangibles, as well as unused plant assets and non-marketable securities.

Net Sales to *Plant Expense*

$$\frac{\text{Net Sales during a given period}}{\text{Interest based on amount equal to plant assets}}$$

Plus Taxes, Insurance, Depreciation and Repairs

This ratio affords a check on the fixed charges in relation to operations at subnormal or over-normal volume.

Adequate cost practice will distribute Plant Expenses in the form of Fixed Charges on Land and Buildings, and on Machinery and Equipment, to each operating department as a part of the cost of the goods produced, to be reflected in proper selling prices for such goods.

Plant Assets to *Plant Expense*

This ratio is similar in calculation to the one preceding, except that plant expense is related to plant assets instead of net sales.

S 3 Net Sales to Working Capital

$$\frac{\text{Net Sales during a given period}}{\text{Average monthly Working Capital during same period}}$$

This measures

Sales productivity of the dollar invested in working capital.

Increase in ratio indicates

Greater turnover on working capital.

If the ratio is too low, the working capital is not being sufficiently used.

If the ratio is too high, the company may be overtrading with resultant danger of financial embarrassment if for any reason sales are suddenly reduced, excessive credit is granted, etc.

1935	1934
$\dfrac{\text{A 33}}{\dfrac{(\text{B 6} - \text{B 17}) + (\text{A 6} - \text{A 17})}{2}}$	$\dfrac{\text{B 33}}{\dfrac{(\text{C 6} - \text{C 17}) + (\text{B 6} - \text{B 17})}{2}}$
1.618 times	.884 times

S 4 Net Sales to Net Worth

Net Sales during a given period

Net Worth at beginning of year

Plus Owned capital contributed during the year—averaged from date it could be expected to produce

Minus Withdrawals of owned capital, and dividends in excess of current earnings—averaged from withdrawal date

This measures

Sales activity of the investment of the stockholders in the business.

Increase in ratio indicates

Greater turnover on all stockholders' equity.

If the ratio is too low, the stockholders' equity is not being sufficiently used.

If the ratio is too high, the company may be striving for volume irrespective of profit, or may be over-expanding and doing too much business for the stockholders' investment, with resultant danger of having to secure unfavorable emergency loans from creditors.

1935	1934
$\frac{A\ 33}{B\ 25 - 3\ \frac{B\ 19}{4}}$	$\frac{B\ 33}{C\ 25}$
1.146 times	.541 times

Related and interdependent ratios are P 4, Net Profit to Net Sales, and P 5, Net Profit to Net Worth. Net profit per dollar of net sales, times the turnover of net worth, produces the net profit per dollar of net worth, thus

Sales S 4 (*Continued*)

$$\frac{\text{P 4}}{\text{Net Profit}} \times \frac{\text{S 4}}{\text{Net Sales}} = \frac{\text{P 5}}{\text{Net Profit}}$$
$$\text{Net Sales} \qquad \text{Net Worth} \qquad \text{Net Worth}$$

Supplementary Ratios

Net Sales to *Tangible Net Worth*

The denominator excludes an amount equal to the book value of goodwill and other intangibles.

Net Sales to *Theoretical Cost of Borrowed and Owned Capital*

$$\frac{\text{Net Sales during a given period}}{\text{(a) + (b) + (c)}}$$

(a) Interest paid on borrowed money, plus expenses incident to obtaining loans (commissions, brokers' fees, bond discount, legal and accounting services, etc.), and

(b) Requirements for preferred stock dividends—averaged if preferred stock changed during year, and

(c) Estimated fair competitive return on common stockholders' equity—averaged if capital changed during year.

This measures

The responsibility involved in the financing plan of the company. N 5, Total Assets to Theoretical Cost of Borrowed and Owned Capital, expresses the same responsibility in terms of total assets rather than net sales.

P 1 Operating Profit to Net Sales

$$\frac{\text{Operating Profit during a given period}}{\text{Net Sales (or Number of Units Sold) during same period}}$$

This measures

Operating efficiency and economy. It is of greater value than P 4, Net Profit to Net Sales, because it limits consideration to operating transactions, and eliminates the effect of financing variations, Federal taxes and other non-operating expense or income items.

Increase in ratio indicates

Increased sales income, and/or
Reduced cost of sales, and/or
Reduced selling and administrative expenses

Improvement may be accomplished by

Selling at higher prices, and/or
Securing a larger increase in sales than in selling costs, and/or
Directing the sales effort to the most profitable lines, and/or
Reducing manufacturing costs and selling and administrative expenses.

1935	1934
A 49	B 49
A 33	B 33
24.67%	12.39%
Operating Profit per Ton Sold	
$47.28	$24.45

Related and interdependent ratios are P 2, Operating Profit to Operating Assets, and S 1, Net Sales to Operating Assets (turnover). Operating profit per dollar of net sales, times the turnover of operating assets, produces the operating profit per dollar of operating assets, thus:

$$\underset{\text{Operating Profit}}{\underset{\text{Net Sales}}{P\,1}} \times \underset{\text{Net Sales}}{\underset{\text{Operating Assets}}{S\,1}} = \underset{\text{Operating Profit}}{\underset{\text{Operating Assets}}{P\,2}}$$

P 2 Operating Profit to Operating Assets

Operating Profit during a given period

Total Assets at beginning of year

Minus Non-operating assets at beginning of year

Plus (a) Owned or borrowed capital contributed during year and (b) non-operating assets realized and put into operating assets—both averaged from date they could be expected to produce.

Minus (a) Withdrawals of owned or borrowed capital from operating assets, (b) operating assets invested in non-operating assets, and (c) dividends paid from operating assets in excess of current earnings—all three averaged from withdrawal date.

This measures

Earning power of the dollars invested in operating assets.

Increase in ratio indicates

Greater financial return on assets employed in operations.

Improvement may be accomplished by

Any action which will result in improvements of any of the other ratios affecting operations; in other words, any improvement in purchasing, manufacturing or selling, but not in the investment of surplus funds or in methods of financing.

1935

$$\frac{A\ 49}{B\ 11 - B\ 2 - B\ 7 + \frac{B\ 7 - A\ 7}{2} - \frac{3\ B\ 19 - A\ 2 - B\ 2}{4}} \qquad \frac{2}{} \qquad 32.34\%$$

1934

$$\frac{B\ 49}{C\ 11 - C\ 2 - C\ 7 - \frac{B\ 2 - C\ 2}{2}} \qquad 7.00\%$$

Profit P 2 (*Continued*)

Related and interdependent ratios are P 1, Operating Profit to Net Sales, and S 1, Net Sales to Operating Assets (turnover). Operating profit per dollar of net sales, times the turnover of operating assets, produces the operating profit per dollar of operating assets, thus

$$\underset{\text{P 1}}{\frac{\text{Operating Profit}}{\text{Net Sales}}} \times \underset{\text{S 1}}{\frac{\text{Net Sales}}{\text{Operating Sales}}} = \underset{\text{P 2}}{\frac{\text{Operating Profit}}{\text{Operating Assets}}}$$

Supplementary Ratio

Operating Profit to *Tangible Operating Assets*

The denominator excludes goodwill and other intangibles.

P 3 Operating Profit to Operating Plant Assets

Operating Profit during a given period

Total Depreciated Plant Assets at beginning of year

Plus Additions to plant assets during year—averaged from date they could be expected to produce

Minus Plant assets sold or scrapped during year—averaged from date they ceased to be used.

This measures

Earning power of the dollars invested in plant assets used in operations.

Increase in ratio indicates

Greater financial return on plant assets employed in operations.

Improvement may be accomplished by

Any action which increases operating profit, and/or

Any action which reduces investment in operating plant assets.

1935	1934
A 49	B 49
$\frac{\text{B 8} + \frac{\$89{,}664 - \$20{,}000}{2}}{2}$	$\frac{\text{C 8} + \frac{\$17{,}544 - \$15{,}000}{2}}{2}$
65.79%	16.32%

Supplementary Ratios

Operating Profit to *Total Plant Assets*

The denominator includes all plant assets, whether or not used in operations.

Operating Profit to *Operating Fixed Assets*

The denominator includes all fixed assets except unused plant assets and non-marketable securities; it therefore includes goodwill and other intangibles.

Operating Profit to *Tangible Operating Fixed Assets*

The denominator excludes goodwill and other intangibles, as well as unused plant assets and non-marketable securities.

P 4 Net Profit to Net Sales

$$\frac{\text{Net Profit during a given period}}{\text{Net Sales (or Number of Units Sold) during the same period}}$$

No Deduction for Dividends—Some analysts advocate the deduction of dividends paid from the Net Profit, on the ground that profits distributed through dividends do not increase the protection of creditors. The weight of opinion, however, seems to be that the primary function of this ratio is to determine the earning power of the sales dollar regardless of dividend policy. Adequate consideration of net profits not distributed as dividends is provided through P 7, Net Profit Left in Business to Net Profit.

This measures

Efficiency and economy. It is of less value, however, than P 1, Operating Profit to Net Sales, for it includes the less controllable non-operating income and expense items, such as income from investments, interest paid on borrowed money and Federal taxes.

Increase in ratio indicates

Increased sales income, and/or
Reduced cost of sales, and/or
Reduced selling and administrative expenses, and/or
Increased non-operating profit, through increase in non-operating income or decrease in non-operating expense.

Improvement may be accomplished by

Selling at higher prices, and/or
Securing a larger increase in sales than in selling costs, and/or
Directing the sales effort to the most profitable lines, and/or
Reducing manufacturing costs and selling and administrative expense, and/or if possible
Increasing non-operating profit through securing a higher return on investments, through reducing interest charges by

Profit P 4 (*Continued*)

refinancing or otherwise, and through making all legitimate tax savings.

1935	1934
A 58 / A 33	B 58 / B 33
21.49%	13.26%
Dollars of Profit per Ton Sold	
$41.19	$26.94

Related and interdependent ratios are P 5, Net Profit to Net Worth, and S 4, Net Sales to Net Worth (turnover). Net profit per dollar of net sales, times the turnover of net worth, produces the net profit per dollar of net worth thus

$$\frac{\text{P 4}}{\text{Net Profit}}{\text{Net Sales}} \times \frac{\text{S 4}}{\text{Net Sales}}{\text{Net Worth}} = \frac{\text{P 5}}{\text{Net Profit}}{\text{Net Worth}}$$

Supplementary Ratio

Gross Profit to *Net Sales*

P 5 Net Profit to Net Worth

Net Profit during a given period

Net Worth at beginning of year

Plus Owned capital contributed during year—averaged from date it could be expected to produce

Minus (a) Withdrawals of owned capital, and (b) dividends in excess of current earnings—both averaged from withdrawal date

This measures

Earning power of the investment of both preferred and common stockholders (capital contributed plus undistributed earnings).

Increase in ratio indicates

Greater financial return on all stockholders' equity.

Improvement may be accomplished by

Any action which will result in improvement of any of the other ratios; in other words, any improvement in purchasing, manufacturing or selling, or in methods of financing and investment of surplus funds.

1935	1934
A 58	B 58
B 25	C 25
22.08%	7.18%

Related and interdependent ratios are P4, Net Profit to Net Sales, and S 4, Net Sales to Net Worth (turnover), Net profit per dollar of net sales, times the turnover of net worth, produces the net profit per dollar of net worth, thus

$$\frac{\text{P 4}}{\text{Net Profit}}{\text{Net Sales}} \times \frac{\text{S 4}}{\text{Net Sales}}{\text{Net Worth}} = \frac{\text{P 5}}{\text{Net Profit}}{\text{Net Worth}}$$

Supplementary Ratios

Net Profit to *Tangible Net Worth*

Net Profit before Interest to *Total Assets*

This measures the total return (interest paid on funded debt and profit on stockholders' equity) on the total capital employed in the business.

P 6 Net Profit to Common Stockholders' Equity

Net Profit for a given period

Minus Requirements for Preferred Stock Dividends—averaged in case of changes in preferred stock

Net Worth at beginning of year

Minus (a) Preferred stock value in liquidation and (b) preferred dividends in arrears

Plus Owned capital contributed during year—averaged from date it could be expected to produce

Minus (a) Withdrawals of common stock capital, and (b) dividends in excess of current earnings—both averaged from withdrawal date.

This measures

Earning power of the common stockholders' investment (capital contributed plus undistributed earnings), after elimination of the maximum equity of preferred stockholders.

Increase in ratio indicates

Greater financial return on common stockholders' equity.

Improvement may be accomplished by

Any action which will result in improvement of any of the other ratios; in other words, any improvement in purchasing, manufacturing or selling or in methods of financing and investment of surplus funds.

1935

$$\frac{A\,58 - (7\%\text{ of }B\,21) - \frac{7\%\text{ of }(A\,21 - B\,21)}{2}}{B\,25 - (1.1 \times B\,21) - \frac{1.1\,(A\,21 - B\,21)}{2}} \qquad 31.43\%$$

1934

$$\frac{B\,58 - (7\%\text{ of }C\,21)}{C\,25 - (1.1 \times C\,21)} \qquad 7.50\%$$

Supplementary Ratios

Net Profit to *Common Stockholders' Equity—Tangible Basis*

Net Profit to *Number of Shares of Common Stock*

P 7 Net Profit Left in Business to Net Profit

Net Profit for a given period

$$\frac{\text{Minus Cash dividends paid during same period}}{\text{Net Profit for the same period}}$$

This measures

Net profits retained in the business to build up the common stockholders' net equity from earnings.

Increase in ratio indicates

Additional security behind preferred stock and behind liabilities.

Ratio may well be calculated also *cumulatively* over a long period

1935	1934
$\frac{A\ 58 - A\ 59}{A\ 58}$	$\frac{B\ 58 - B\ 59}{B\ 58}$
48%	12%

N 1 Net Worth to Liabilities

$$\frac{\text{Net Worth on balance sheet of a given date}}{\text{Total Liabilities on the same balance sheet}}$$

This measures

Relationship between the investment by stockholders and the borrowed capital.

Increase in ratio indicates

An easing of the debt pressure, and a further removal from the criticism of being "top heavy with debt."

Improvement may be accomplished by

Investment of additional capital by stockholders.
Retention of net profit in business.
Reduction in current liabilities and/or funded debt.

1935	1934
A 25	B 25
A 20	B 20
885%	464%

Supplementary Ratios

Net Worth	to	*Current Liabilities*
Net Worth	to	*Funded Debt*
Tangible Net Worth	to	*Liabilities*
Tangible Net Worth	to	*Current Liabilities*
Tangible Net Worth	to	*Funded Debt*

N 2 Net Worth to Fixed Assets

Net Worth on balance sheet of a given date

Total Fixed Assets
Minus Depreciation Reserves and Mortgages applicable thereto, on same balance sheet

This measures

Fixed position of the investment of stockholders.

Increase in ratio indicates

Smaller proportion of investment of stockholders tied up and not currently available to creditors.

Improvement may be accomplished by

Cessation of conversion of liquid into fixed assets, and possibly of over-expansion of plant.

1935	1934
$\frac{A\,25}{A\,7 + A\,8 + A\,9 + A\,10}$	$\frac{B\,25}{B\,7 + B\,8 + B\,9 + B\,10 - B\,19}$
228%	253%

In spite of the considerable increase in net worth and decrease in fixed assets shown by the illustrative balance sheets, Exhibit A, the percentages above show a decrease owing to the paying off of the funded debt.

Supplementary Ratios

Net Worth to *Working Capital*

This is the complementary ratio of N 2, Net Worth to Fixed Assets. An increase in the ratio of net worth to working capital indicates greater effectiveness of net worth as a liquidating protection to creditors.

Tangible Net Worth to *Fixed Assets*
Tangible Net Worth to *Working Capital*

N 3 Plant Assets to Funded Debt

Total Fixed Assets on balance sheet of a given date
Minus Depreciation Reserves
Funded Debt on same balance sheet

This measures

Danger of over-expansion of plant through financing by means of funded obligations.

Increase in ratio indicates

A more favorable relation between the depreciated plant value and the funded debt, with less danger of the debt becoming in part a residuary claim against current assets.

Improvement may be accomplished by

Development of proper plan for systematic reduction of funded debt.

Refinancing through contributions of owned capital.

1935	1934
A 8	B 8
A 19	B 19
—%	269%

Supplementary Ratios

Working Capital to *Funded Debt*

This ratio is the complementary ratio to Fixed Assets to Funded Debt (see below). An increase in the ratio of working capital to funded debt indicates not only a better capacity for meeting the current charges attributable to the funded debt, but also a wider opportunity to effect reductions in the funded debt itself.

Fixed Assets to *Funded Debt*
Tangible Fixed Assets to *Funded Debt*

N 4 Borrowed Money to Cost of Borrowed Money

Average Liability Outstanding during year for Borrowed Money

Minus Average Bank Balances required to be maintained because of borrowings

Interest Paid on Borrowed Money

Plus Expenses incident to obtaining loans (commissions, brokers' fees, bond discount, legal and accounting services, etc.)

Minus Interest received on portion of bank balances required to be maintained because of borrowings.

This measures

Cost of financing through borrowed money.

Increase in ratio indicates

Less expense per dollar of borrowed money, with favorable effect on profit ratios.

Improvement may possibly be accomplished by refinancing.

N 5 Total Assets to Theoretical Cost of Borrowed and Owned Capital

Total Assets at Beginning of Year

Plus Owned or borrowed capital contributed during the year—averaged from date it could be expected to produce.

Minus (a) Withdrawals of owned or borrowed capital, and (b) dividends in excess of current earnings—both averaged from withdrawal date.

(a) Interest Paid on Borrowed Money

Plus Expenses incident to obtaining loans (commissions, brokers' fees, bond discount, legal and accounting services, etc.), *AND*

(b) Requirements for preferred stock dividends—averaged if preferred stock changed during year, *AND*

(c) Estimated fair competitive return on common stockholders' equity—averaged if capital changed during the year.

This measures

Relative responsibility assumed by company under the financing plan covering all capital used.

Increase in ratio indicates

Less responsibility on part of capital used, or more capital in use without increased responsibility.

EXHIBIT A

COMPARATIVE BALANCE SHEETS as at DECEMBER 31, 1935, 1934 and 1933

ASSETS	Item No.	A December 31, 1935	B December 31, 1934	C December 31, 1933	1935 Total	1935 Tangible	1934 Total	1934 Tangible
Cash	1	$ 351,475	$ 423,969	$ 401,816	11.1%	12.3%	13.6%	15.1%
Marketable Investments	2	897,613	645,782	537,025	28.5	31.5	20.8	23.0
Trade Accounts and Notes Receivable, Less Reserves	3	280,256	300,609	323,217	8.9	9.9	9.7	10.7
Other Accounts and Notes Receivable	4	11,583	18,458	22,933	.4	.4	.6	.7
Inventories	5	371,061	358,215	395,086	11.8	13.0	11.5	12.7
Total Current Assets	6	1,911,988	1,747,033	1,680,077	60.7	67.1	56.2	62.2
Investment Securities (not marketable, or necessarily held)	7	26,917	110,605	110,605	.8	.9	3.5	3.9
Plant and Equipment, less Reserves for Depreciation	8	909,192	951,237	1,041,015	28.9	31.9	30.6	33.8
Prepaid Expenses	9	2,503	2,460	2,460	.1	.1	.1	.1
Goodwill	10	300,000	300,000	300,000	9.5	..	9.6	..
Total Assets	11	*$3,150,600*	*$3,111,335*	*$3,134,157*	*100.0%*		*100.0%*	
(Total Tangible Assets)	12	*($2,850,600)*	*($2,811,335)*			*(100.0%)*		*(100.0%)*
LIABILITIES AND NET WORTH								
Bank Loans	13	$ 100,000	$ 60,000	$ 70,000	3.2%	3.5%	1.9%	2.1%
Trade Accounts and Notes Payable	14	81,711	41,330	60,137	2.6	2.9	1.3	1.5
Other Accounts and Notes Payable	15	85,374	24,134	40,314	2.7	3.0	.8	.9
Accrued Expenses	16	5,458	12,119	12,493	.1	.2	.4	.4
Total Current Liabilities	17	272,543	137,583	182,944	8.6	9.6	4.4	4.9
Accounts and Notes Payable (due after 1 year)	18	47,229	61,407	61,407	1.5	1.6	2.0	2.2
Bonds, 6%, due April 1, 1936 (called April 1, 1935)	19	.....	353,000	353,000	..	..	11.3	12.5
Total Liabilities	20	319,772	551,990	597,351	10.1	11.2	17.7	19.6
Capital Stock—First Preferred 7%	21	1,075,000	650,000	650,000	34.1	37.7	20.9	23.1
Capital Stock—Common	22	1,062,500	850,000	850,000	33.8	37.3	27.3	30.2
Surplus—Appropriated	23	159,962	119,820	119,820	5.1	5.6	3.9	4.3
Surplus—Unappropriated	24	533,366	939,525	916,986	16.9	8.2	30.2	22.8
Net Worth	25	2,830,828	2,559,345	2,536,806	89.9		82.3	
(Tangible Net Worth)	26	(2,530,828)	(2,259,345)			88.8		80.4
Total Liabilities and Net Worth	27	*$3,150,600*	*$3,111,335*	*$3,134,157*	*100.0%*		*100.0%*	
(Total Liabilities and Tangible Net Worth)	28	*($2,850,600)*	*($2,811,335)*			*(100.0%)*		*(100.0%)*

The balance sheets shown above include representative asset, liability and net worth divisions, and serve as the basis for the development of the accompanying ratio calculations.

EXHIBIT B

COMPARATIVE PROFIT AND LOSS STATEMENTS FOR THE YEARS ENDED DECEMBER 31, 1935 and 1934

(Amounts marked * represent losses, deductions or decreases)

	Item No.	A 1935	B 1934	% of Sales 1935	% of Sales 1934	Per Ton 1935	Per Ton 1934	Increase Amount	Increase Per Ton
TONS SOLD	29					13,720	6,960	6,760	
Gross Sales	30	$2,702,340	$1,456,653	100.00%	100.00%	$196.96	$209.29	$1,245,687	$12.33*
Less Returns and Allowances	31	54,978*	69,385*	2.03	4.76	4.00*	9.97*	14,407*	5.97*
Less Cash Discounts Allowed	32	18,226*	14,113*	.67	.97	1.33*	2.03*	4,113	.70*
Net Sales	33	2,629,136	1,373,155	100.00%	100.00%	191.63	197.29	1,255,981	5.66*
Cost of Goods Sold	34	1,823,625	1,082,137	69.36	78.80	132.92	155.48	741,488	22.56*
Gross Profit before adjustments	35	805,511	291,018	30.64	21.20	58.71	41.81	514,493	16.90
Cost Adjustments									
Add Interest Charged to Cost	36	38,938	28,844	1.48	2.10	2.84	4.14	10,094	1.30*
Cash Discounts Taken	37	4,871	1,932	.18	.14	.34	.28	2,939	.06
Adjusted Gross Profit	38	849,320	321,794	32.30	23.44	61.89	46.23	527,526	15.66
Selling and Administrative Expenses									
Salaries	39	117,868	61,678	4.48	4.49	8.59	8.86	56,190	.27*
Traveling Expense	40	9,891	8,729	.38	.64	.72	1.26	1,162	.54*
Advertising	41	7,250	8,162	.27	.59	.53	1.17	912*	.64*
Office Supplies and Expense	42	8,932	6,426	.34	.47	.65	.92	2,506	.27*
Legal and Accounting Services	43	3,823	4,238	.15	.31	.28	.61	415*	.33*
Miscellaneous	44	14,991	10,180	.57	.74	1.09	1.46	4,811	.37*
Total Selling and Administrative Expenses	45	162,755	99,413	6.19	7.24	11.86	14.28	63,342	2.42*
Operating Profit, before adjustments	46	686,565	222,381	26.11	16.20	50.03	31.95	464,184	18.08
Adjustments to Operating Profit									
Deduct Bad Debts	47	29,196*	52,178*	1.11*	3.80*	2.13*	7.50*	22,982*	5.37*
Loss on Equipment Sold	48	8,641*	59*	.33*	...	.63*	.01*	8,582	.62
Adjusted Operating Profit	49	648,728	170,144	24.67	12.40	47.27	24.44	478,584	22.83
Non-Operating Income and Expense									
Add Sundry Interest Received	50	4,134	2,314	.16	.17	.31	.33	1,820	.02*
Income from Investments	51	43,931	37,761	1.67	2.75	3.20	5.43	6,170	2.23*
Deduct Bond Interest Paid	52	.....	5,295*	...	.40*	...	.76*	5,295*	.76*
Loss on Securities Sold	53	31,595*	.....	1.20*	...	2.30*	...	31,595	2.30
Donations	54	14,736*	.....	.56*	...	1.07*	...	14,736	1.07
	55	1,734	34,780	.07	2.52	.14	5.00	33,046*	4.86*
Net Profit before Federal Income Taxes	56	650,462	204,924	24.74	14.92	47.41	29.44	445,538	17.97
Provision for Federal Income Taxes	57	85,374	22,839	3.25	1.66	6.23	3.28	62,535	2.95
Net Profit for Year	58	565,088	182,085	*21.49%*	*13.26%*	*$ 41.18*	*$ 26.16*	*$ 383.003*	*$15.02*
Cash Dividends	59	293,605*	159,546*						
Stock Dividends	60	637,500*	.....						
Increase in Surplus for Year	61	366,017*	22,539						
Surplus at Beginning of Year—Exhibit A	62	1,059,345	1,036,806						
Surplus at End of Year—Exhibit A	63	*$ 693,328*	*$1,059,345*						

The profit and loss statements shown above include representative income and expense items, and furnish certain data necessary in the development of the accompanying ratios.

Although gross sales, returns, allowances and discounts are expressed in the percentage columns upon the basis of *gross* sales, the remainder of the items are expressed upon the basis of *net* sales.

Comparative Ratio Values and Composite Index

The ratios just presented indicate important relationships between specific items or parts of financial statements. Significant as all these ratios may be, however, they are not of equal importance.

The assignment of arbitrary weights to indicate the relative values of particular ratios will vary between analysts. Nevertheless, solely for the purpose of illustrating the method used, there is inserted below a list of relationships which in a particular case might be assigned to some of the basic ratios:

(Illustration based on an example by Wall and Duning in *Ratio Analysis of Financial Statements*)				*Relative Weight*
C 1	Current Assets	to	Current Liabilities	25%
N 1	Net Worth	to	Liabilities	25
N 2	Net Worth	to	Fixed Assets	15
C 3	Net Sales	to	Inventory	10
C 4	Net Charge Sales	to	Trade Receivables	10
S 2	Net Sales	to	Operating Plant Assets	10
S 4	Net Sales	to	Net worth	5
				100%

Substitution may of course be made, or other ratios added, with the relative weights adjusted as experience demands, the total always being 100%.

Upon such a basis, it is possible to reduce all the indicated ratio movements to *one index figure* which will summarize the individual improvements and declines, and will rise or fall with the *preponderance* of movement in the individual ratios, as shown below:

Ratios	Relative Weight (1)	Standard Base Ratios (2)	Company (3)	Relation (3 ÷ 2) (4)	Actual Index Value (4 × 1) (5)	Index Above Par (5 — 1) (6)	Index Below Par (1 — 5) (7)
C 1	25%	200%	220%	110%	27.50%	2.50%	
N 1	25	150	160	106	26.50	1.50	
N 2	15	250	220	88	13.20		1.80%
C 3	10	800	600	75	7.50		2.50
C 4	10	600	500	83	8.30		1.70
S 2	10	400	400	100	10.00	–	–
S 4	5	300	240	80	4.00		1.00
Par Index	100%	Company's Index Total			97.00	4.00%	7.00%
							4.00
			Index below par		3.00%		3.00%

Analysts are coming to feel that it is difficult for the mind adequately to summarize the net effect of varied and possibly opposing ratio measurements, and that the development of an average index figure as above (provided it is safeguarded through control over a violent upward movement in any one ratio which would hide the result of deficiencies in other ratios) is the simplest way of acquiring a complete and sensitive indicator of financial status and earning power.

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